

**Remarks**

Claims 1 and 4-24 are pending in this application. Claims 1 & 14 have been amended. Claim 2 is canceled. No new matter has been added as a result of the amendments herein.

**Rejection of claims 1, 2, 4-6 and 14-17 under 35 USC § 103(a)**

Claims 1, 2, 4-6 and 14-17 are rejected under 35 USC § 103(a) as being unpatentable over Kondo *et al.* (5,625,473) in view of Obikawa *et al.* (5,200,110). Applicant respectfully disagrees.

The Examiner states that regarding [*sic*] "claims 1 and 14, Kondo *et al.* discloses a method of fabricating a diffractive or non-dispersive polymer dispersed liquid crystal electrooptic device..." The Examiner goes on to recite the elements of Applicant's claimed invention (specifically referring to claims 1 & 14) and contends that these elements are taught by Kondo *et al.* except for providing a nematic liquid crystal in the form of an eutectic mixture.

Kondo *et al.* disclose a method for producing a liquid crystal display device that includes the steps of attaching a first substrate having a counter electrode to a second substrate; injecting a mixture including a liquid crystal and photocurable resin into a gap that is between the counter electrode and pixel electrodes; and irradiating light to the mixture. However, there are significant differences between what is taught by Kondo and the presently claimed invention even beyond the lack of providing a nematic liquid crystal in the form of an eutectic mixture.

In order to establish a *prima facie* case of obviousness, "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references) must teach or suggest all of the claim limitations." M.P.E.P. §2143, see also, *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

As mentioned above, there are significant differences between what is taught by Kondo *et al.* and that presently claimed even beyond the differences stated by the Examiner. For example, Kondo uses a chiral nematic liquid crystal, whereas the presently claimed invention does not utilize a chiral nematic liquid crystal as fully supported by Applicant's specification. This support can be found in, for example, Fig. 5.

Referring to FIG. 5, specifically to p-polarized light data: p-polarized light, with no applied field ( $E = 0$ ), is diffracted ( $\sim 50\%$  transmission) from a phase grating made according to the present invention. The grating modulation results from the finite difference in index of refraction of the polymer-rich regions and the nematic-rich regions. Specifically, the index of the nematic-rich regions is dominated by the extraordinary index of the nematic, which is greater than the index of the polymer-rich material.

As the field increases, the nematic directors rotate so as to align along the field direction. This decreases the index modulation. As the field approaches infinity – here, as  $E \rightarrow 10 \text{ V}/\mu\text{m}$  – the index of the nematic-rich regions, as seen by the propagating beam, approaches the ordinary index of the nematic liquid crystal. Since the ordinary index of the nematic and the index of the polymer-rich regions are nearly equal, the index modulation vanishes, and the beam propagates through the grating without loss.

Turning now to the s-polarized data: again, with no applied field ( $E = 0$ ), s-polarized light is not diffracted at all. The transmission is  $\sim 92\%$ ;  $\sim 8\%$  of the light is lost due to Fresnel reflections from the two air-glass interfaces. The high transmission value indicates that the indices of the nematic-rich regions and the polymer-rich regions are well matched. The diffraction efficiency for s-polarized light does not change as a function of applied field. This is because the nematic directors rotate in a plane perpendicular to the electric field in the optical beam.

What would be the consequence of employing chiral nematic materials. If a chiral nematic liquid crystal were used in place of, or in addition to, the nematic phase liquid crystal, the diffraction efficiency for s-polarized light would be non-zero in the field-

off state. This is because the chiral nematic directors would have components perpendicular to the grating vector and parallel with the electric field of the optical beam. Therefore, the grating would have non-zero index modulation for s-polarized light in the field-off state if chiral nematic materials were part of the PDLC mix. Further, the index modulation for s-polarized light would decrease with increasing applied electric field if chiral nematic materials were utilized. This effect is absent from the data in Fig. 5.

Claims 1 and 14 have been amended so as to emphasize this feature, *i.e.*, the recitation of a non-chiral nematic liquid crystal.

Kondo produces a display with active regions (pixels) that can only be  $\sim 10^4 \text{ cm}^2$ , whereas the present invention teaches how to make devices with an active region of  $\sim 10 \text{ cm}^2$ . Further, Kondo produces a display that directs light over a wide, continuous range of angles, whereas the present invention achieves superior switching performance in switches that steer light into at most two discrete directions, with minimal angular spreading in each of the two allowed directions (data presented in the application bolsters this contention, *e.g.*, see Fig. 4 of the present application).

Regarding claims 1 and 14, the Examiner states that “providing a nematic liquid crystal” is disclosed by Kondo **19:49-55**. This is not supported by the text as Kondo specifically teaches in **19:49-55** that “the liquid crystal material used in the present invention” includes a “two-frequency drive liquid crystal,  $\Delta\epsilon < 0$ ” and “nematic liquid crystal with cholesteric liquid crystal.” The presently claimed invention uses nematic liquid crystals with positive dielectric anisotropy ( $\Delta\epsilon > 0$ ).

In addition, the liquid crystal material used in Kondo contains a photo-curable liquid crystal component [**19:62-66**], which is contrary to the concept of the present invention which employs a non-photo-curable nematic liquid crystal.

Regarding claims 1 and 14, the Examiner states that “mixing said nematic liquid crystal with said photo-curable pre-polymer mixture to form a homogeneous nematic/pre-polymer mixture with said nematic liquid crystal being greater than 40% (by weight) of said

combined homogeneous mixture” is taught by Kondo **9:26-33** and **20:29-42**. Kondo **9:26-33** teaches that the nematic is to be mixed with 0.3% of chiral dopant S-811 [**9:30**] thereby transforming the nematic to a cholesteric liquid crystal, whereas the present invention utilizes a nematic phase liquid crystal not adulterated with any component such as a dopant. Kondo **20:29-42** is not relevant in light of the teaching in **19:62-66** where the photo-curable components include a photo-curable nematic. The present invention does not rely upon a photo-curable nematic liquid crystal.

Regarding claims 1 and 14, the Examiner states that “providing a cell comprising a pair of spaced apart transparent substrates that are each coated with a transparent conductive layer without the inclusion of an alignment layer for aligning said nematic liquid crystal” is taught by Kondo **9:6-25**. This is not supported as Kondo utilizes a black mask material inside and integral to the cell [**9:10-11**, **9:20-25**, and Fig. 8] thereby pixellating the display into opaque and transparent regions. Thus, Kondo’s devices are inherently lossy. By way of example, if the lateral dimension of the pixels in Kondo is 125  $\mu\text{m}$  [**16:42-44**] and the pixels are on a 250  $\mu\text{m}$  pitch, the maximum transmittance of the Kondo display is 25%. In contrast, the present invention teaches how to create an electrooptic device that is not pixellated, but rather, has an active area that can span millimeters to centimeters – enough to pass a collimated optical beam in its entirety. As a consequence of there being no opaque areas in the photo-cured parts of the devices made according to the presently claimed invention, the transmittance demonstrated by his devices is >90% (see Figs. 2, 4, 8, 9).

Regarding claims 1 and 14, the Examiner states that “filling said cell with said homogeneous nematic/pre-polymer mixture” is covered by Kondo **9:18-21**; however, since the stated reference does not address the specific step of cell filling, Kondo fails to teach this step of the presently claimed invention.

Regarding claims 1 and 14, the Examiner states that “photo-curing said nematic/pre-polymer mixture using a spatially inhomogeneous illumination source” is taught by Kondo in **9:34-42**. The method for curing the display devices in Kondo is markedly different from the method taught by the present invention. For example, Kondo performs a cure using spatially

uniform, unpolarized uv-light that is blocked by a macroscopic-scale mask that is integral to the display cells. Further, Kondo cures the display devices at elevated temperature (*viz.* 40 °C) while the devices of the presently claimed invention are cured at room temperature.

Regarding claims 1 and 14, the Examiner states that “utilizing the above fabricating method to create said diffractive or non-dispersive electrooptic device in the form of a polymer dispersed liquid crystal (PDLC) exhibiting low scattering loss and high index modulation” is taught by Kondo in **1:54-65** and **20:17-28**. Kondo (and the reference cited therein) is actually a counter-example and bolsters the distinction between Kondo and the presently claimed invention. First, the reference to the Japanese Laid-Open Patent Publication cited in **1:55-56** of Kondo actually discloses how to build a display “so that the transmittance and contrast are low” [**1:63-65**]; whereas, the present invention teaches how to build high contrast, low loss (*i.e.*, high transmittance) PDLC electrooptic devices. Further, the present invention employs “index modulation,” referring specifically to half the difference between the indices of refraction of the liquid-crystal-rich, and polymer-rich regions in the device.

The Examiner next addresses some of the dependent claims. Applicant contends that the independent claims define allowable subject matter. It is axiomatic in patent law that if an independent claim defines allowable subject matter then the claims depending therefrom also define allowable subject matter. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), and Hartness International, Inc. v. Simplimatic Engineering Co., 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed. Cir. 1987). Given that the rejected claims depend from base claims and those independent claims define allowable subject matter, then the claims at issue must necessarily define allowable subject matter. The reasons for allowability of the base claims are set forth above. However, the issues raised by the Examiner pertaining to the dependent claims are individually addressed below.

Regarding claims 4 and 15, Applicant asserts that the respective independent claims define allowable subject matter, therefore, claims 4 and 15 necessarily define allowable subject matter.

Regarding claim 5, the Examiner states that “said PDLC is comprised of a dispersion of discrete droplets containing nematic liquid crystal-rich material in a polymer-rich matrix” is taught by Kondo, specifically referencing Fig. 8. In fact, this comparison emphasizes the vast difference between Kondo and the presently claimed invention in several features. First, Fig. 8 of Kondo clearly shows chiral nematic phase liquid crystal regions **38** extend continuously from the bottom substrate **34** to the top substrate **36**, or over a distance of several microns. In contrast, the present invention has a completely different morphology as depicted by Figs. 2(c) and 3. For example, the nematic-rich liquid crystal regions are confined by polymer-rich material so that the nematic-rich material occupies volumes that are in the nanometer regime, some 1,000 times smaller than the smallest dimensions found in Kondo. Second, the pixel size – the largest active area possible – is on the order of  $125\ \mu\text{m}$  [16:42-44], or an area of  $1.6 \times 10^{-4}\ \text{cm}^2$  in the teaching of Kondo; in contrast, the active area in the present invention can easily be made to be  $1\text{-}10\ \text{cm}^2$ , or some 5 orders of magnitude larger than that of Kondo. Third, the active area in the display devices of Kondo are interrupted by a black matrix **30**, thin-film transistors **36** *etc.*, while the electrooptic devices of the instant invention have uninterrupted active areas spanning  $1\text{-}10\ \text{cm}^2$ , or can be made larger or smaller.

Regarding claims 6 and 17, the Examiner states that “said PDLC is comprised of regions of inter-connected spaces that are filled with nematic liquid crystal-rich material” is taught by Kondo referencing Fig. 8. First, Kondo teaches away from using nematic phase liquid crystal, instead uses cholesteric phase liquid crystal (*i.e.*, chiral nematic) that is comprised of a nematic and a chiral agent [9:30]. Second, the chiral nematic liquid crystal in Kondo is confined by hard polymer walls that are separated by the pixel dimension of on the order of  $125\ \mu\text{m}$  [16:42-44]. Thus, the operating voltage of a Kondo-type display is  $<10$  volts and the relaxation time is on the order of milliseconds. In contrast, the nematic-rich material in the devices of the present invention relate to volumes with dimensions in the nanometer size regime. Data based on the present invention shows switching voltages in the 100-volt range, and a relaxation time constant in the micro-second regime. These two operating parameters provide clear evidence that Kondo does not teach how to confine liquid crystalline material to sub-micron sized volumes, but rather, to much larger volumes.

Applicant strongly disagrees with the premise made by the Examiner on page 4 of the present Office Action that Kondo discloses an electrooptic device “that is basically the same as that recited in claims 1 and 14” [in Kralik]. Neither the microscopic morphology (nanometer-sized in the present invention; several micron-sized in Kondo), nor the resulting switching voltage (around 100 volts in the present invention; a few volts in Kondo), nor the resulting switching speed (microsecond-regime in the instant invention; millisecond-regime in Kondo), nor the size of the active area (1-10 cm<sup>2</sup> in the instant invention; 10<sup>-4</sup> cm<sup>2</sup> in Kondo), nor the active switching material (nematic in the present invention; chiral nematic in Kondo) nor many other device aspects and fabrication methods as described by Kondo are the same, or even remotely the same as that claimed in the present invention.

The assertion by the Examiner that “it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the method of Kondo *et al.* with the teaching of Obikawa *et al.* by employing a nematic liquid crystal in the form of a eutectic mixture so as to obtain a liquid crystal electrooptic device having a wide temperature range and requiring a low driving voltage” is not supported. In fact, devices made according to the present invention switch in the range of 100 volts, while the devices made according to Kondo switch at <10 volts. This large discrepancy in switching voltage emphasize the vast difference between the art in Kondo and Obikawa and the presently claimed invention.

The deficiencies found in Kondo are not remedied by applying Obikawa, thus a case of *prima facie* obviousness cannot be established. Applicant has provided more than sufficient argument above to support this contention. Moreover, there is a paucity of motivation to combine references as put forth by the Examiner. Assuming *arguendo* that one skilled in the art did combine such references, there is no evidence that he would be successful in arriving at the presently claimed invention. Therefore, Applicant respectfully requests reconsideration and withdrawal of the present rejection.

**Rejection of claims 7-9 and 18-20 under 35 USC 103(a)**

Claims 7-9 and 18-20 are rejected under 35 USC § 103(a) as being unpatentable over Kondo *et al.* (5,625,473) in view of Obikawa *et al.* (5,200,110) as applied to claims 1, 2, 4-6,

and 14-17 above and further in view of Sumiyoshi *et al.* (6,278,506). Applicant respectfully disagrees.

The Examiner states that [*sic*] "Kondo *et al.* in view of Obikawa *et al.* discloses a method of fabricating a diffractive or non-dispersive polymer dispersed liquid crystal electrooptic device that is basically the same as that recited in claims 7-9 and 18-20 except for the step of deriving said spatially inhomogeneous illumination source used to photo-cure the nematic/pre-polymer mixture from the interference of two coherent optical beams within said cell."

In view of the comments above, Applicant contends the distinct fabrication methods claimed in the instant invention and that disclosed in Kondo, in addition to the differences in the material constituents, yield devices with significant structural and functional differences. In fact, the presently claimed invention provides for a low loss, high contrast electrooptic switching device which Kondo alone or in combination fails to have.

The Examiner continues and asserts that the disclosure of Sumiyoshi *et al.*, in particular, Figs. 5A-C, placed in combination with Kondo renders the presently claimed invention obvious.

Applicant respectfully disagrees with this assertion in view of the significantly different fabrication methods taught by Sumiyoshi in comparison with that presently claimed, in fact, Sumiyoshi teaches away from that which is presently claimed in the instant invention. For example, Sumiyoshi applies an electric field across the cell during exposure [6:37-38] and, further, mounts the cell on a rotation stage [6:34-35] for the purpose of making multiple exposures during the cure. These steps are no doubt advantageous for the devices described by Sumiyoshi, but the same steps would be deleterious for the devices of the presently claimed invention. In another example, an applied electric field would rotate the grating vector out of the plane of the cell [see Fig. 2(b) of the present application], thereby leading to loss during use.

Sumiyoshi teaches photo-curing that differs with the presently claimed invention. These differences in methodology are not trivial and lead to very different devices with very different morphologies and operational characteristics.

Sumiyoshi photo-cures using an electric field across the cell, while the present invention does not, because such a field would deleteriously affect device performance by aligning the liquid crystal in a direction other than the grating vector in the field-off state.

Regarding claims 8 and 19, the Examiner states “it is obvious that the coherent optical beams each have a wavelength in the ultraviolet spectrum for radiating the photo-curable polymer.” Since the absorbance bands of photo-initiators can be wider than 100 nm (*e.g.*, IRGACURE-184, -907, or OXE01 from Ciba-Geigy) and extend beyond 400 nm, it is relevant to specify the wavelengths of operation for the lasers.

Regarding claims 9 and 20, the Examiner states that Fig. 18 and **10:15-48** in Sumiyoshi teach how to fabricate an unslanted grating, thereby rendering claims 9 and 20 obvious. This is incorrect, which is easily seen with the aid of Fig. 1 below. Figure 1A shows the scenario described verbally in Sumiyoshi **10:15-48**, namely, two exposures are made in the cell, one by interfering optical beams with wavevectors  $k_1$  and  $k_2$ , and a second by interfering optical beams with wavevectors  $k_1$  and  $k_3$ . Figure 1B shows the grating vectors  $\Delta k_{12}$  and  $\Delta k_{13}$ , respectively, that result from these exposures. Note that the grating vectors are slanted, and do not lie in the plane of the cell. Therefore, this fabrication scheme described by Sumiyoshi does not produce unslanted gratings, as he recognizes in **10:43-47**, where he characterizes the gratings as “differently declined.” Hence, the assertion made by the Examiner is not supported by employing the cited references.

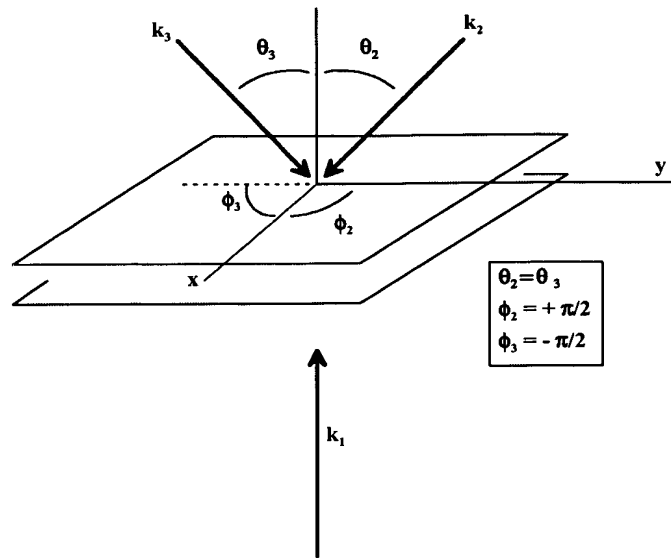


FIGURE 1A. Sumiyoshi describes two PDLC grating exposures in 10:15-48 that are illustrated in this figure. The first grating is formed from the interference between optical waves described by wavevectors  $k_1$  and  $k_2$ , while the second grating is formed via the interference between optical waves described by wavevectors  $k_1$  and  $k_3$ .

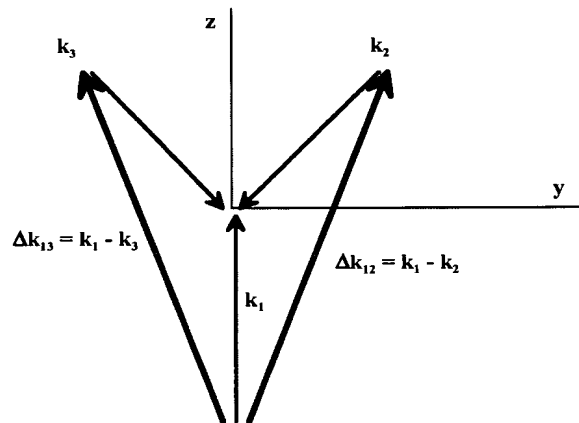


FIGURE 1B. This figure shows the grating vectors that result from the two exposures described in Fig. 1A. These are  $\Delta k_{12} = k_1 - k_2$  and  $\Delta k_{13} = k_1 - k_3$ . Note that these vectors have components in the plane of the cell that cancel, leaving only components normal to the substrate surfaces.

In addition to the discussion provided above as to the significant differences between the presently claimed invention and the cited references, it is axiomatic in patent law that

dependent claims depending from an independent claim that defines allowable subject matter necessarily define allowable subject matter. (*In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), and *Hartness International, Inc. v. Simplimatic Engineering Co.*, 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed. Cir. 1987).) Applicant contends that claims 1 and 14 define allowable subject matter and, therefore, claims depending therefrom define allowable subject matter. Therefore, Applicant respectfully requests reconsideration and withdrawal of the present rejections.

**Rejection of claims 10-13 and 21-24 under 35 USC 103(a)**

Claims 10-13 and 21-24 are rejected under 35 USC § 103(a) as being unpatentable over Kondo *et al.* (5,625,473) in view of Obikawa *et al.* (5,200,110) and Sumiyoshi *et al.* (6,278,506) as applied to claims 7-9 and 18-20 above and further in view of Popovich *et al.* (6,339,486). Applicant respectfully disagrees.

The Examiner states "The diffractive or non-dispersive polymer dispersed liquid crystal electrooptic device of Kondo *et al.* as modified in view of Obikawa *et al.* and Sumiyoshi *et al.* above includes all that is recited in claims 10-13 and 21-24 except for a grating period that is greater than half the wavelength of the light to be diffracted by the PDLC transmission grating during use of said transmission grating and a spatial frequency that is sufficiently high to prohibit propagating diffracted orders for normal incident light, thereby creating an electrooptic retarder with electrical tunable birefringence." The Examiner continues and asserts that Popovich *et al.* supplies the necessary feature deficient in the other cited references.

The invention of Obikawa is directed toward a "liquid crystal compositions for electro-optical display devices," and for providing "improved liquid crystal compositions ... for ... lowering the driving voltage" [3:19-27]. The presently claimed invention is distinct from liquid crystal display devices. Additionally, the presently claimed invention is distinct in that it is not directed to reducing switching voltage. In fact, as pointed out above, the presently claimed invention yields electrooptic switching devices that require incredibly high switching voltages, wholly unsuitable for electrical driving technologies utilized in conventional liquid crystal displays. Further, there are significant differences between the

fabrication techniques of the presently claimed invention and those taught by Kondo and Sumiyoshi, as described above. Additionally, there are significant differences between the performance of the display devices of Kondo and the presently claimed invention. (These difference are discussed above.) Still further, Sumiyoshi does not achieve high contrast, low loss functionality in display devices, which is one of the features of the presently claimed invention. The devices of Sumiyoshi are inherently lossy and low contrast because of the necessary requirement that multiple gratings be written according to his teaching.

The Examiner asserts that claims 10-13 and 21-24 are unpatentable in view of Popovich. Popovich, though, like Kondo, utilizes a different material system than the presently claimed invention. In fact, the preferred material according to Popovich contains between 20-35% liquid crystal content [6:40-43], while the presently claimed invention employs > 40% liquid crystal content (see claims 1 and 14).

The Examiner states that Kondo, Obikawa, and Sumiyoshi include all that claims 10-13 and 21-24 include, "except for a grating period that is greater than half the wavelength of the light to be diffracted by the PDLC transmission grating during use of said transmission grating and a spatial frequency that is sufficiently high to prohibit propagating diffracted orders for normal incidence light, thereby creating an electrooptic retarder with electrical tunable birefringence." In fact, Kondo, Obikawa, and Sumiyoshi offer no motivation with regard to PDLC diffractive and non-dispersive devices, and it is manifestly clear from these disclosures that the display devices therein are incapable of switching optical beams with low loss and high contrast. The grating structure, the means to produce it, and the materials employed in the presently claimed invention are not taught by the cited references. (These differences are discussed in greater detail above.) For example, Kondo, Obikawa and Sumiyoshi describe display devices that are incapable of steering or switching optical beams with high contrast and low loss.

The Examiner asserts that Popovich *et al.* disclose methods to produce diffractive and non-dispersive devices; however, the presently claimed invention is significantly different. For example, Popovich teaches that the PDLC materials are to contain < 40% liquid crystal content, while the presently claimed invention uses PDLCs that are > 40% nematic liquid crystal content. A consequence of this is that the devices described by Popovich do not

possess highly oriented nematic liquid crystal regions. See, for example, columns 4 and 5 in Popovich, which describe substantial switching for both s- and p-polarized optical beams. In contrast, the devices of the presently claimed invention comprise a highly oriented liquid crystal content which is manifest in the switching data presented in Fig. 4 of the patent application. There s-polarized light is not switched at all while p-polarized light is switched for a wide range of applied electric field. Another example can be found in the high-spatial frequency data provided by Popovich [17:2-11]. There, Popovich reports a retarder device with maximum birefringence of only  $\Delta n = 0.008$ . In contrast, the presently invention is directed to a high-spatial frequency PDLC device with birefringence  $\Delta n = 0.048$ , a value that is six times larger due to the high degree of liquid crystal orientation in the device. Thus, the devices described by Popovich are significantly different than those presently claimed.

Finally, the Examiner suggests that the teaching of Kondo could be combined with the teaching of Popovich to yield a high contrast, low loss PDLC gratings. Arguments proffered hereinabove establish a contrary view. For example, the devices described by Kondo are entirely unsuitable for transmitting millimeter- to centimeter-sized optical beams with low loss because the pixel size of the Kondo devices is only  $\sim 10^{-4} \text{ cm}^2$ , while the inter-pixel areas are coated with a black, light absorbing film. Additionally, 125- $\mu\text{m}$ -pixels on a 250- $\mu\text{m}$ -pitch transmit only 25% of light incident at normal incidence, and even less light at oblique incidence angle, which is the case for switchable diffraction gratings according to the presently claimed invention. Further, the materials of Popovich are unsuitable for high contrast, low loss PDLC switches and static devices because the liquid crystal concentration and orientation are not optimized, in contrast to the presently claimed invention.

In addition to the discussion provided above as to the significant differences between the presently claimed invention and the cited references, it is axiomatic in patent law that dependent claims depending from an independent claim that defines allowable subject matter necessarily define allowable subject matter. (*In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), and *Hartness International, Inc. v. Simplimatic Engineering Co.*, 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed. Cir. 1987).) Applicant contends that claims 1 and 14 define allowable subject matter and, therefore, claims depending therefrom define

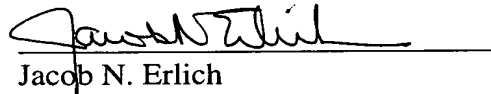
allowable subject matter. Therefore, Applicant respectfully requests reconsideration and withdrawal of the present rejections.

In conclusion, in view of the above remarks, Applicant respectfully requests the Examiner to enter this amendment which clearly places claims 1, 2 and 4-24 allowable over the prior art and issue a Notice of Allowance or, in the alternative, the Examiner should enter this amendment for purposes of appeal. In the event the Examiner has any further questions, as pointed out above, the Examiner is encouraged to call Applicant's attorney at the number provided below.

Applicant believes that no fees are due at this time, however, should there be any fees, please charge Deposit Account No. 50-1078.

The Examiner is invited to call the undersigned attorney at (617) 854-4000 should he determine that a telephonic interview would expedite prosecution of this case.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Jacob N. Erlich", is written over a horizontal line.

Jacob N. Erlich  
Attorney for Applicant  
Reg. No. 24,338

Date: January 12, 2005